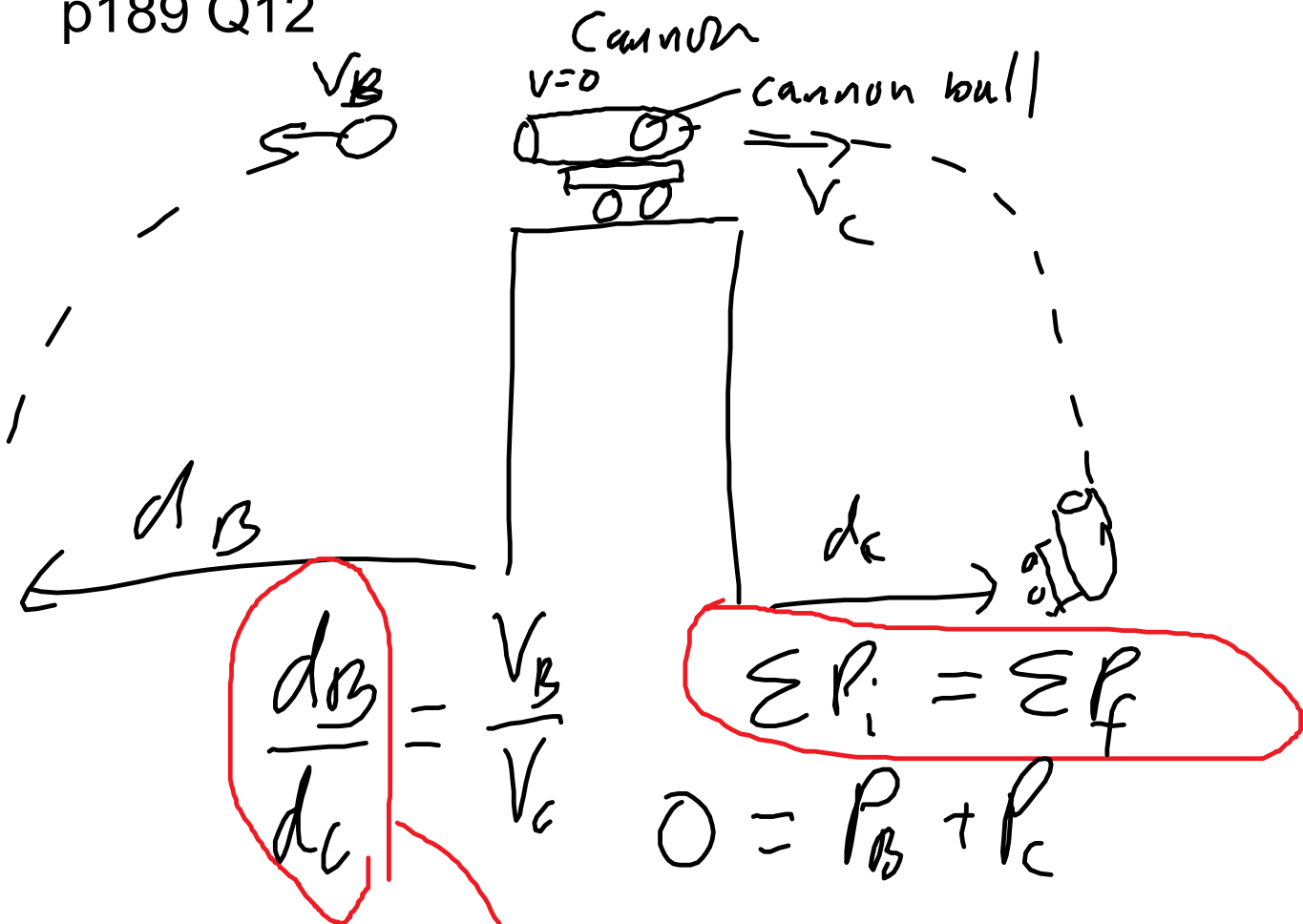


Quiz next class 1-D momentum p176-188  
 questions from homework?  
 p189 Q12



$$0 = m_B v_B + m_c v_c$$

$$m_B v_B = -m_c v_c$$

$$v_B / v_c = -m_c / m_B = d_B / d_c = -m_c / m_B$$

$$d_B / d_c = -m_c / m_B$$

$$m_B d_B = -m_c d_c$$

$$d_c = -m_B d_B / m_c = -4.5 \text{ kg} (215 \text{ m}) / 225 \text{ kg}$$

$$= 4.5 \times 215 / 225 = 4.3 = 4.3 \text{ m}$$

Q10



The diagram shows a spring between two masses, 1.5 kg and 4.5 kg. Below the diagram, the conservation of momentum equation is written:

$$\sum p_i = \sum p_f$$

$$0 = 1.5 \text{ kg} (-27 \text{ cm/s}) + 4.5 \text{ kg } v$$

$$v = 90 \text{ cm/s}$$

impulse =  $p_f - p_i$

1. Write a paragraph about the physics of driving in the snow. - Do this first - we will go over it in 15 minutes.
  2. A 200.0 kg train is moving on a frictionless track at 10.0 m/s. If 100.0 kg of snow fill up the transport cars, what will be then new velocity of the train?
  3. p194 q15, 18, 26
- 
1. Write a paragraph about the physics of driving in the snow. - Do this first - we will go over it in 15 minutes.

<https://www.youtube.com/watch?v=7dP1RinpdmI>

notice the cars/buses/trucks with locked tires

notice the cars/buses/trucks with locked tires (holding the brake) slide but the car that drives down the hill is able to turn. What's the deal?

Snow has a lower coefficient of friction than pavement, so winter tires or chains will improve the coefficient of friction.

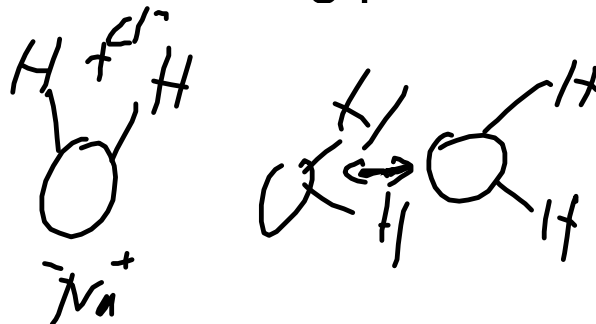
$F=ma$  - small acceleration, less force is required. Driving slower helps with requiring less acceleration except when going uphill.

\* Never spin the tires or lock the tires - ease on the accelerator or pump the brakes.

static friction is greater than sliding (kinetic) friction - so if the tires go with the ground, you have better grip.

when you spin the tires you heat the snow, melts and refreezes as ice - bad.

salt - lowers the freezing point, breaks up the ice



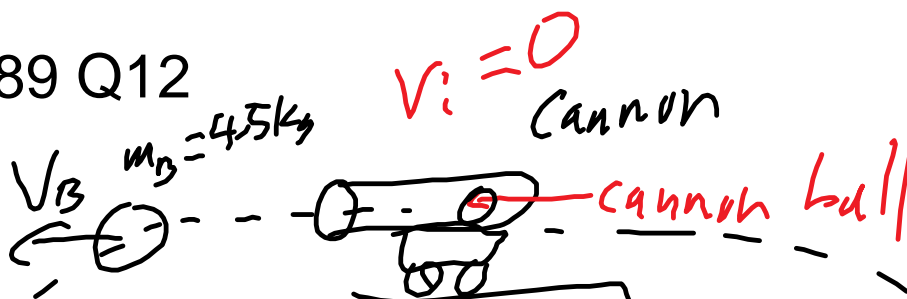
increase the weight of the car, increases the normal force, thus increasing the friction.

$$F_f = \mu F_N$$

cement blocks in the trunk, bags of sand or salt, friends,

## Homework

p189 Q12



$$\frac{V_B}{V_C} = \frac{d_B}{d_C}$$

$$P = m v$$

$$\sum P_i = \sum P_f$$

$$0 = P_B + P_C$$

$$0 = m_B V_B + m_C V_C$$

$$m_B V_B = -m_C V_C$$

$$m_B v_B - m_C v_C$$

$$\frac{V_B}{V_C} = \frac{-m_C}{m_B}$$

$$= \frac{d_B}{\cancel{d_C}} \frac{-m_C}{m_B}$$

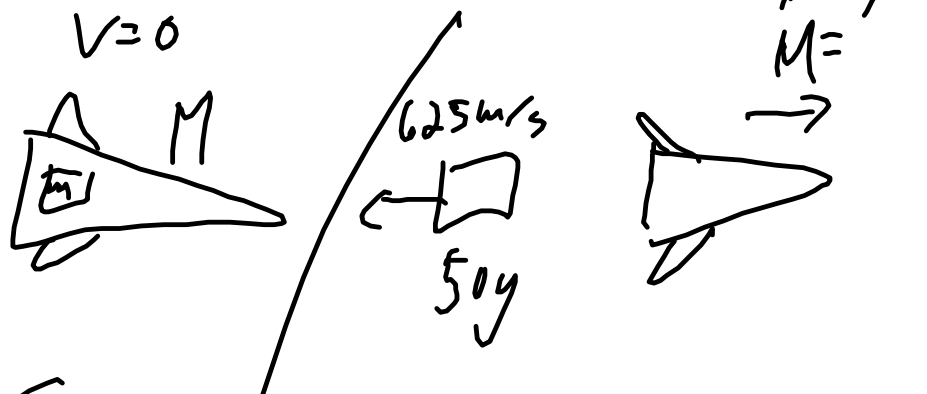
$$m_B d_B = -m_C d_C$$

$$d_C = \frac{-m_B d_B}{m_C}$$

$$d_C = \frac{-(4.5 \text{ kg})(215 \text{ m})}{(225 \text{ kg})}$$

$$d_C = -4.3 \text{ m}$$

Q 9



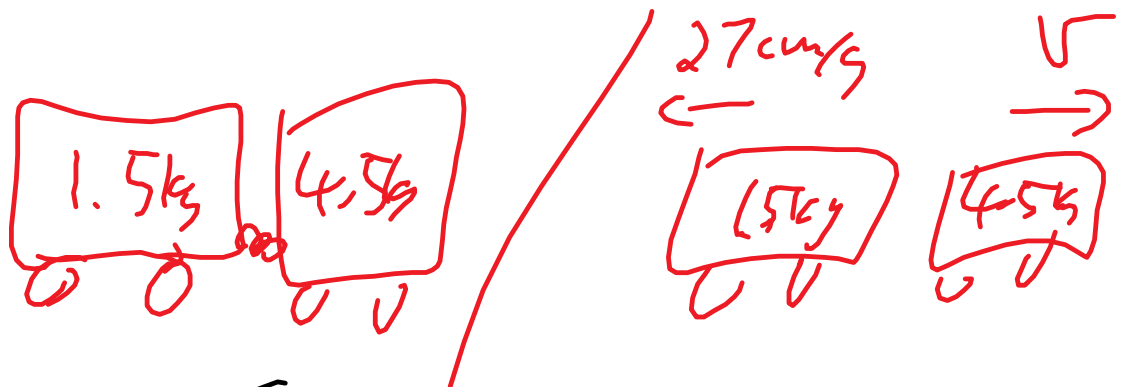
$$\sum p_i = \sum p_f$$

$$0 = m_f v_f + m_R v_R$$

$$0 = 0.050 \text{ kg} (625 \text{ m/s}) + 4.00 \text{ kg} v_R$$

$$v_R = \frac{31.25}{4} \text{ m/s}$$

$$v_R = -7.8 \text{ m/s}$$



$$\sum p_i = \sum p_f$$

$$0 = 1.5 \text{ kg} (27 \text{ cm/s}) + 4.5 \text{ kg} (v)$$

$$v = -9.0 \text{ cm/s}$$

1. Write a paragraph about the physics of driving in the snow. - Do this first - we will go over it in 15 minutes.
2. CR 1.1-1.4 p188
3. A 100.0 kg train is moving on a frictionless track at 10.0 m/s. If 100.0 kg of snow fill up the transport cars, what will be then new velocity of the train?
4. p194 q15, 18, 26

Driving in the snow:

snow has lower coefficient of friction than pavement.

When braking, apply gentle pressure - don't lock the wheels!!! You lose control.

<https://www.youtube.com/watch?v=7dP1RinpdmI>

the cab was able to turn by letting the wheels go, or accelerating slightly - static friction is greater than kinetic (sliding) friction - think cross country skiing.

ease on the accelerator and ease on the brake  
never spin the tires - kinetic friction and heats and melts the snow, that refreezes as ice.  
rock the car forward in the snow

Increase the normal force, by increasing the mass of the car by having a heavier car, fill it up, put bag of sand or salt to increase the weight and use it to put under the wheels if you are stuck, put friends in your car.

before you go up a hill, pick up speed so your momentum can carry you over icy spots

start in second gear, you get less torque ( $F$ ) on the wheels, and less chance of spinning

snow tires and chains improve the coefficient of friction